CHAPTER 6 ENVIRONMENTAL IMPACT ASSESSMENT STUDY

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6.1 Introduction

6.1.1 Background

The IEE described in Chapter 5 above was carried out in the first phase of the Study, during the time when the Port development poposals were being devised. It assessed the environmental impacts of the four alternative developments considered by the Study and concluded that an expansion within the existing port, which included the removal of polluted sediment and polluting industries around the River Dane and Malku Bay, was strongly preferred on environmental grounds.

The Port proposals were then developed further in discussion with KSSA and Klaipeda Municipality, and via consultation meetings with various interested organisations and individuals. The proposed scheme, as described in Chapter 2 and 3 in Volume II of this report, comprises the following main elements:

- A Master Plan for development of the port to the year 2025, comprising development of the existing port and construction of the new outer port;
- A Short-Term Plan for development of the port to 2015, comprising the most urgent elements of the Master Plan. These are improving rail access in the south of the existing port and constructing the first phase of the outer port development.

This chapter contains the study results of the environmental impacts of the Short-Term Plan, and is not a formal document for EIA.

6.1.2 Study Area

The study area for the EIA is the area directly affected by the developments of the Short-Term Plan, and the immediate surroundings where the development could be visible and audible. This is shown on Figure III.6.1-1, and is:

- The beach, sea and land area at Melnrage I, within a radius of 1 km from the edges of the proposed development;
- The proposed new rail route at the south of the port, and a strip of land 500 m on either side.

6.1.3 Approach

The aim of an Environmental Impact Assessment is to predict the likely effects of a proposed development on the environment, assess their significance, and devise means whereby any significant negative impacts can be mitigated (reduced to acceptable levels). In this Study this was achieved by the following activities:

- A description of the environment of the study area was prepared by collecting and analysing existing data relating to physical and chemical conditions, ecology and the human environment;
- A description of the proposed developments was prepared on the basis of information provided by the Port Planning experts of the JICA Study Team;
- The potential impacts of the developments during construction and when they are operating, were identified by visualising the development superimposed on the existing environment, and considering how they would interact;

Figure III.6.1-1 EIA Study Areas (shown in blue)

- The significance of the impacts was determined by reference to national and international standards and criteria (such as water quality standards, legal designations, etc) where available, and using expert judgement based on a knowledge of impacts produced by similar developments elsewhere;
- Measures to reduce negative impacts to acceptable levels were devised in discussion with Port Planning and Engineering experts of the Study Team to ensure that measures proposed are technically feasible and cost-effective.

The results of each of these aspects are described in the following sections.

6.2 Existing Environment

6.2.1 Data Sources

The IEE presented in Chapter 5 above contains a detailed description of the environment of the port and the surrounding area, based on data collected by government departments and other organisations and individuals, mainly over the preceding 1-2 years. This provides an up-to-date baseline of conditions in an area which includes the locations of both developments proposed by the Short-Term Plan, so this description was used as the main source of information on the existing environment for the EIA.

This was supplemented by collecting additional data relating specifically to Melnrage and the area south-east of the port, in those fields where such data was available. This mainly comprised:

- Results of routine monitoring of water and sediment quality along the Lithuanian Coast, conducted by the Marine Research Centre of the Ministry of Environment;
- Data on the environment of the Port Channel and the adjacent coast, published in "The Only Lithuanian Seaport and its Environment" (Joksas, Galkus, Stakeniene, 2003) and "Monitoring the dispersion of sand particles during reconstruction of Klapieda Port entrance channel" (Institute of Geography, Vilnius, 2000);
- Surveys conducted for this Study, which included measurements of water and sediment quality at the coast and in the port channel;
- Data on various aspects of the human environment provided by the State enterprise "Registru Centras" and the Klapieda Public Health Centre;
- Data on population and employment was not available for the study area, so estimates were made from an assessment of the number of houses and average family sizes, and the number of employees of registered business enterprises.

The description of the existing environment of the port and surrounding area is contained in Section 5.2 above, and the additional data specific to the EIA study areas is presented below.

6.2.2 Physical Environment

(1) Topography and Bathymetry

Photo III.6.2-1 shows that, like much of the land around the port, the Melnrage area is a few metres above Baltic Sea Level (BSL), and is generally quite flat. There is some higher ground in the Giruliai Forest to the east, and in the belt of sand dunes at the top

of the beach, which reach 4-5 m in height, but the only significantly higher ground nearby is on the Curonian Spit, which rises to 10-20 m within a kilometre of its northern tip. The study area to the south of the port is also flat and generally featureless (Photo III.6.2-2), with the exception of the small valley cut by the Smeltale River, which is a few metres wide, and 1-2 m below the surrounding land.

Figure III.6.2-1 shows that the bathymetry of the coast near Melnrage is much as described in Section 5.2.3 above. The beach and the immediate subtidal area slope gradually down to around 2 m below BSL, and then at most locations there is a trench around 1 m deep, created by wave action. The gentle slope then continues offshore, where the seabed reaches a depth of 10 m approximately one kilometre from the beach, and 15 m, 2 km away.

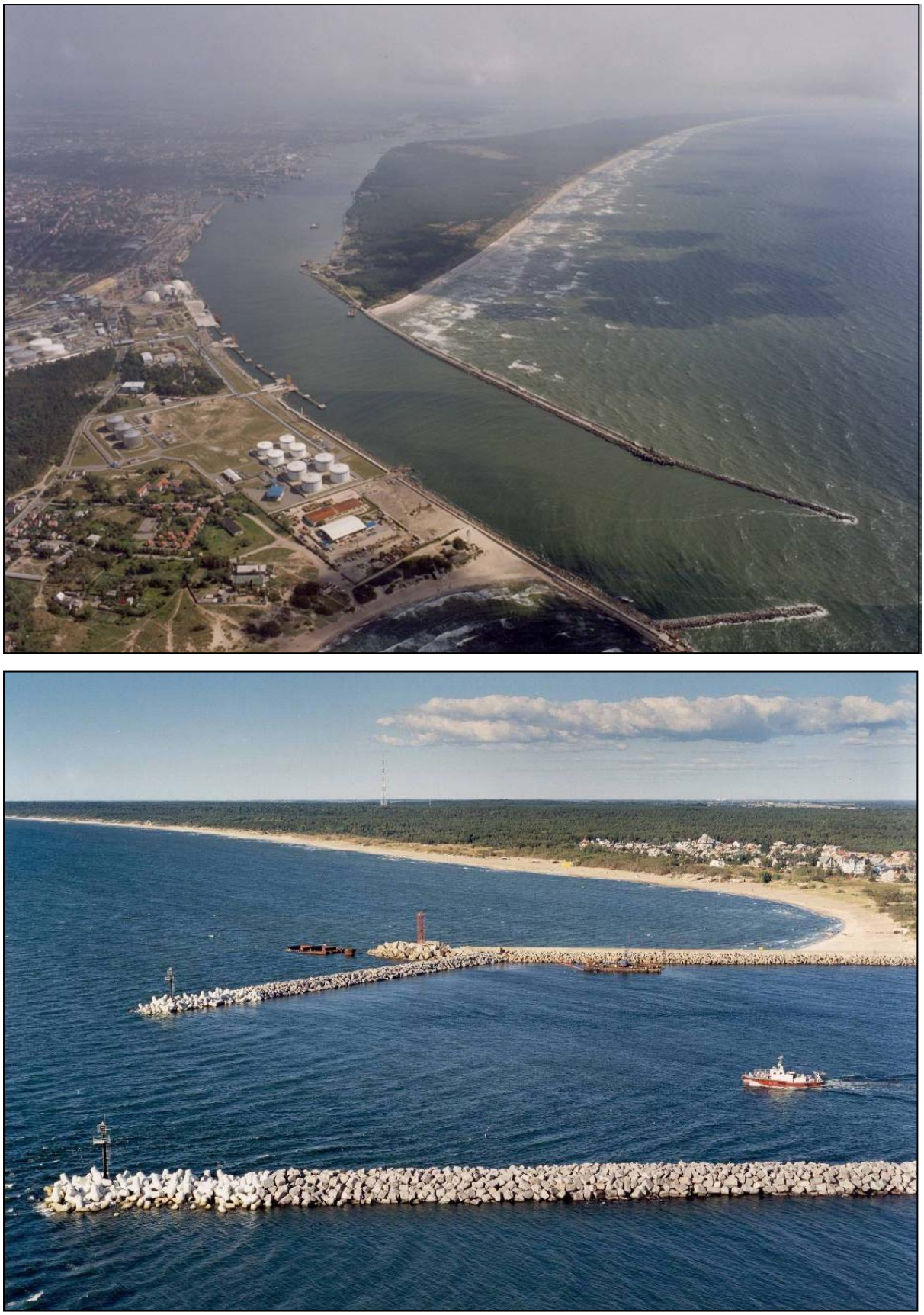
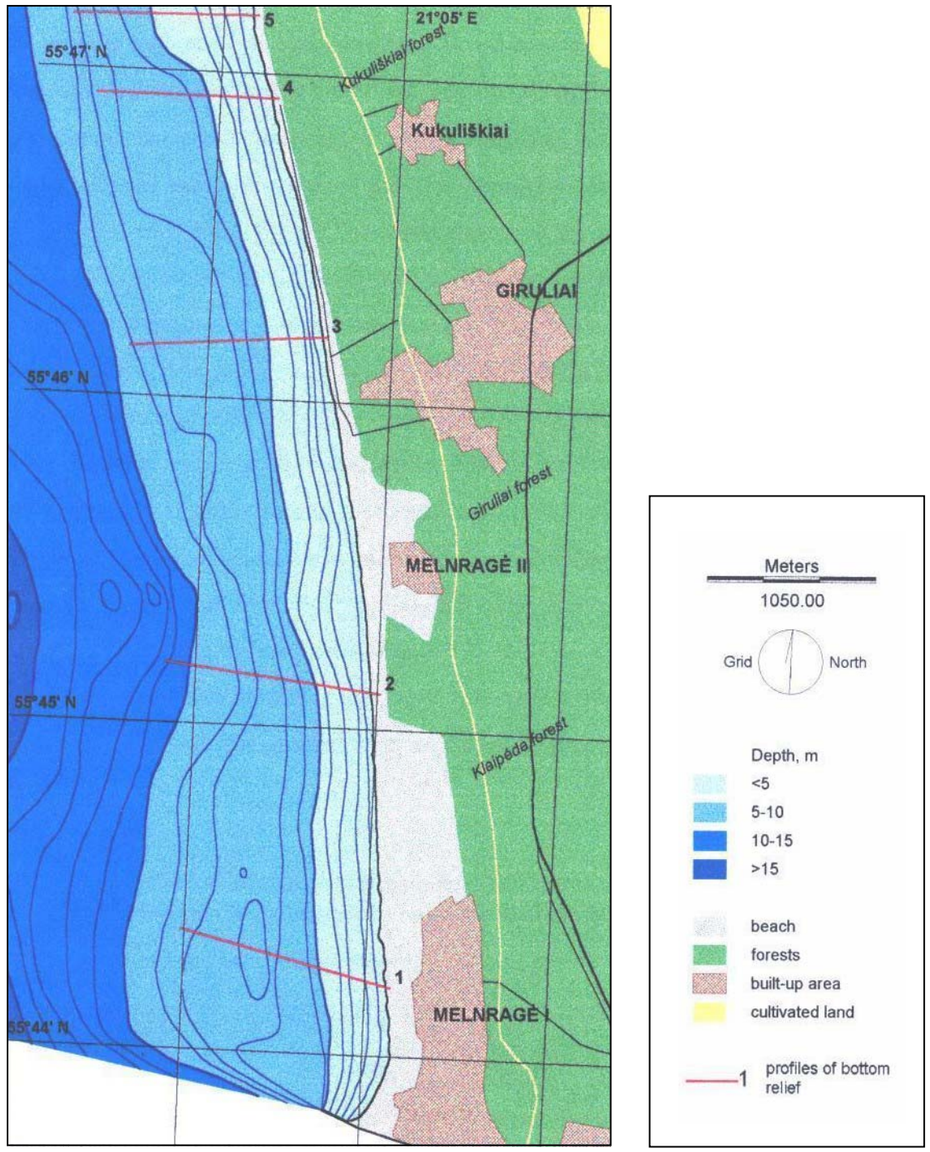
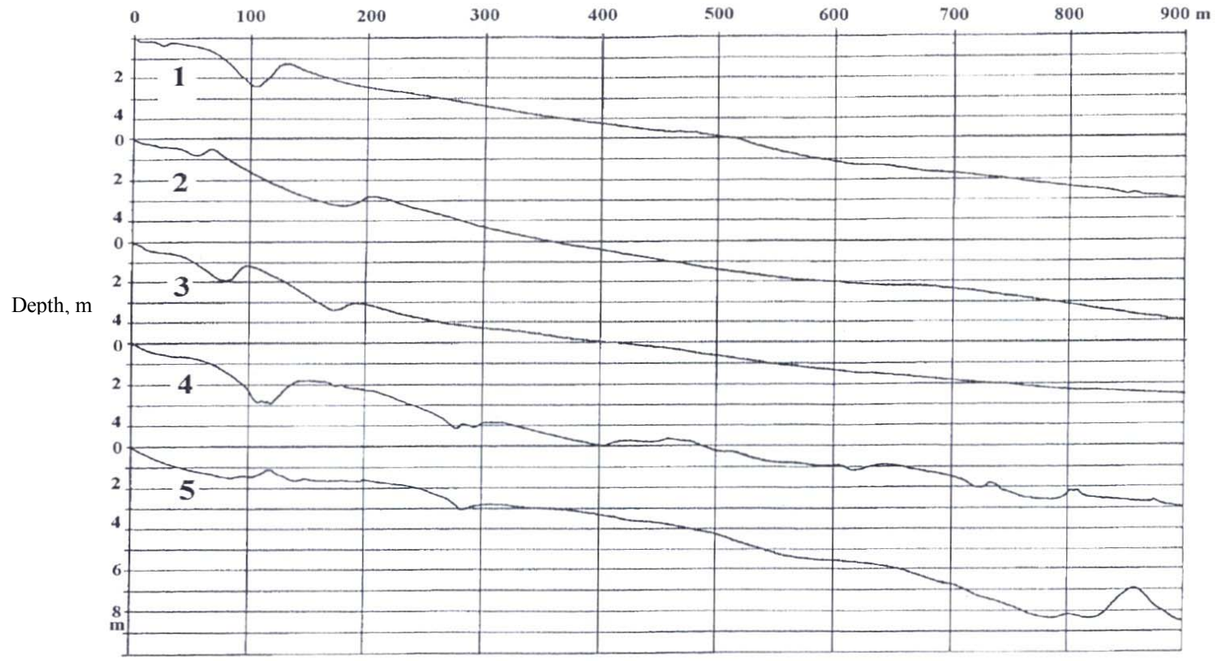


Photo III.6.2-1 General views of the area around Melnrage (top is looking SE, bottom is looking NW)

Photo III.6.2-2 General views of the area south-east of Klaipeda Port





Source: Selection of the experimental site for recultivation of the underwater slope of the coastal zone with clean sand and monitoring of sand particles dispersion during the reconstruction of the entrance channel of Klaipeda port. (2000). Scientific report. Institute of Geography. Vilnius, 2000.

Figure III.6.2-1 Bathymetry of the Melnrage Coast.

(2) Geology and Sediments

Figure III.6.2-2 shows that the surface geology of Melnrage is very much a reflection of its development at the northern edge of the Curonian Spit that grew from sand deposited between a chain of morraine islands left after the last Ice Age. This formed a continuous barrier along the coast until 2,000 years ago when the lagoon broke through to the sea, establishing the channel entrance some distance south of its present location. Melnrage is formed from the same eolian (wind-blown) deposits as the Spit, laid down during the Holocene period, which have been carried north and east under the prevailing direction of wind and waves. At both locations there is a narrow belt of sediment of marine origin, but at Melnrage this is on the landward side of the eolian sands, presumably from the time when this was the original coastline. Figure III.5.2-6 above shows that the coast has extended seawards to the north of the channel mouth after construction of the breakwaters in the mid- 17th century, which suggests that the eolian material has collected here during the subsequent period.

The geology of the southern study area is more complex, and is dominated by moraine (till) material left by the retreating glaciers in the Baltija period of the Pleistocene, and marine sediments of the later Littorina period, when the Baltic Sea first formed, as a large freshwater lake. There is also a thin band of fluvial sand and gravel, deposited along the route of the Smeltale River.

Figure III.6.2-3 shows that surface sediment on the beach and in the subtidal area at Melnrage consists mainly of fine-medium grained sand, which becomes finer with distance offshore. This is because the beach and nearshore area are subject to wave action so the smaller particles are kept in suspension, and settle in deeper water where there is little effect of waves below the surface layers, and currents are generally slower.

6.2.3 Chemical Environment

(1) Water Quality

Figure III.6.2-4 shows the results of water quality monitoring conducted by the Marine Research Centre in 2002 at stations along the 15 m contour offshore of Melnrage and Olandu Kepures. This indicates that coastal water is of generally good quality, and the levels of most parameters, and variations throughout the year are very similar at both stations, and are also similar to those recorded in port waters by KSSA during the same period (see Section 5.2.4 and Figure III.5.2-7 above).

Water temperature shows the normal cycle of high values in summer and lower values in spring and autumn, and at Melnrage the maximum reached 21 ºC in August 2002, which is higher than would be recorded in similar latitudes elsewhere, because the Baltic is shallow and more influenced by air temperature than larger deeper seas.

Oxygen levels also show the normal pattern of high values during spring and autumn when there is sufficient sunlight for phytoplankton to photosynthesise, producing oxygen, which is more soluble in cooler water. Values then fall in summer, because of the reduced solubility. Oxygen saturation is also generally as would be expected in coastal waters, reaching levels of over 100% in spring and early summer because ofrapid phytoplankton growth. The vertical bars on Figure III.6.2-4 show however that saturation fell to 55-62% in August at both stations, and as these samples were

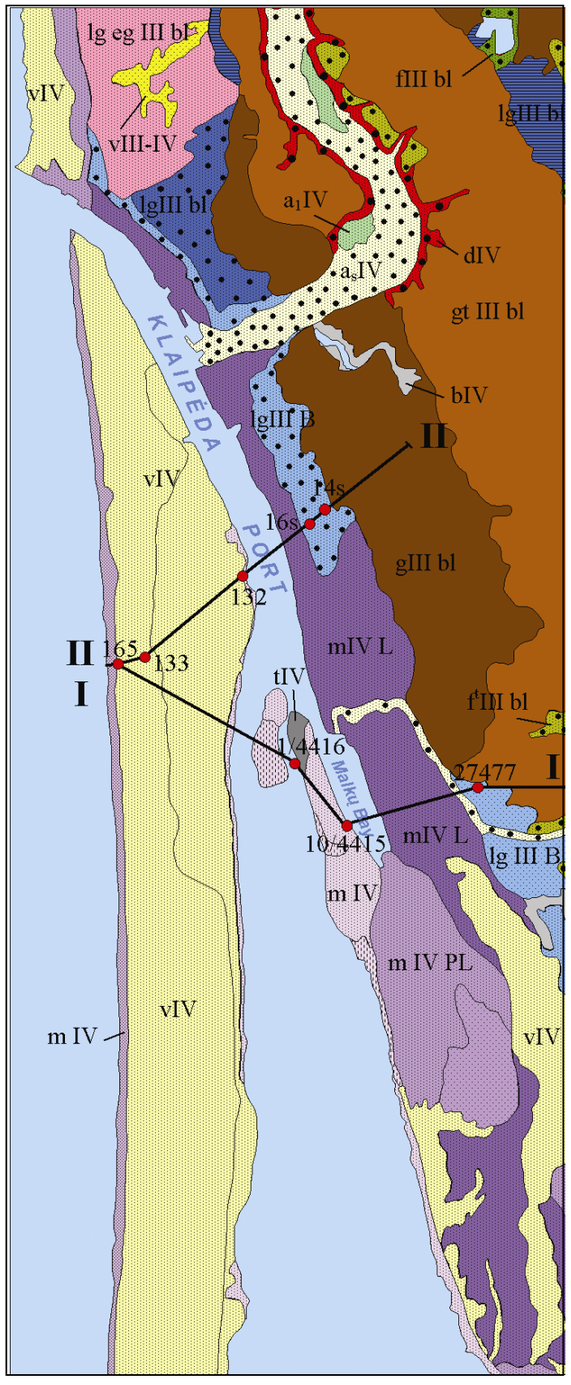
taken at depths of 13 and 15 m it could be that oxygen was depleted at this time by bacterial decomposition of organic material accumulating on the sea bed.

Although water around the port is polluted to an extent by organic matter released by activities in the port and discharged by rivers that flow into the lagoon, this material is not evident at the coast. Biochemical Oxygen Demand (BOD) and total nitrogen and phosphorus are all considerably lower at the coastal stations than the levels recorded in the port during the same period (see Figure III.5.2-7). This suggests that pollutants flowing out from the port are dispersed rapidly by waves and currents outside the entrance, and diluted in the much greater volume of water.

This is confirmed by Figure III.6.2-5, which shows the levels of three common pollutants of coastal waters, together with their corresponding limit values under European Union environmental legislation. This shows that levels of hydrocarbons, mercury, and coliform bacteria (which include bacteria derived from sewage) at the coastal stations are well below EU limits. Comparing these results with those collected in the port by KSSA (Figure III.5.2-8) shows again that pollution levels are higher in port waters, particularly in the enclosed harbours, and in the channel nearby.

None of the values recorded at the coastal stations, including the relatively low levels of oxygen saturation in August 2002, suggest that the coastal water is polluted.

No data has been found on the quality of water in the Smeltale River, which is the only significant surface water in the southern study area (see Figure III.6.2-13 below). However this river should not be greatly polluted as its catchment lies mainly to the south-east of the city, where there is little inhabitation and the land is mainly used for subsistence-level farming, so it should not be subject to excessive use of fertilizers or pesticides, and there are no industrial or sewage discharges along its route.



Lithological symbols

- Till (morainic loam)
- Gravel
- Gravel and sand
- Sand with gravel
- Sand various size grain
- Medium-grained sand
- Fine- grained sand
- Very fine-grained sand
- Silty sand
- Silt
- Sandy silt
- Recent floating peat belt
- Technogenic deposits (only in the geological cross-sections)

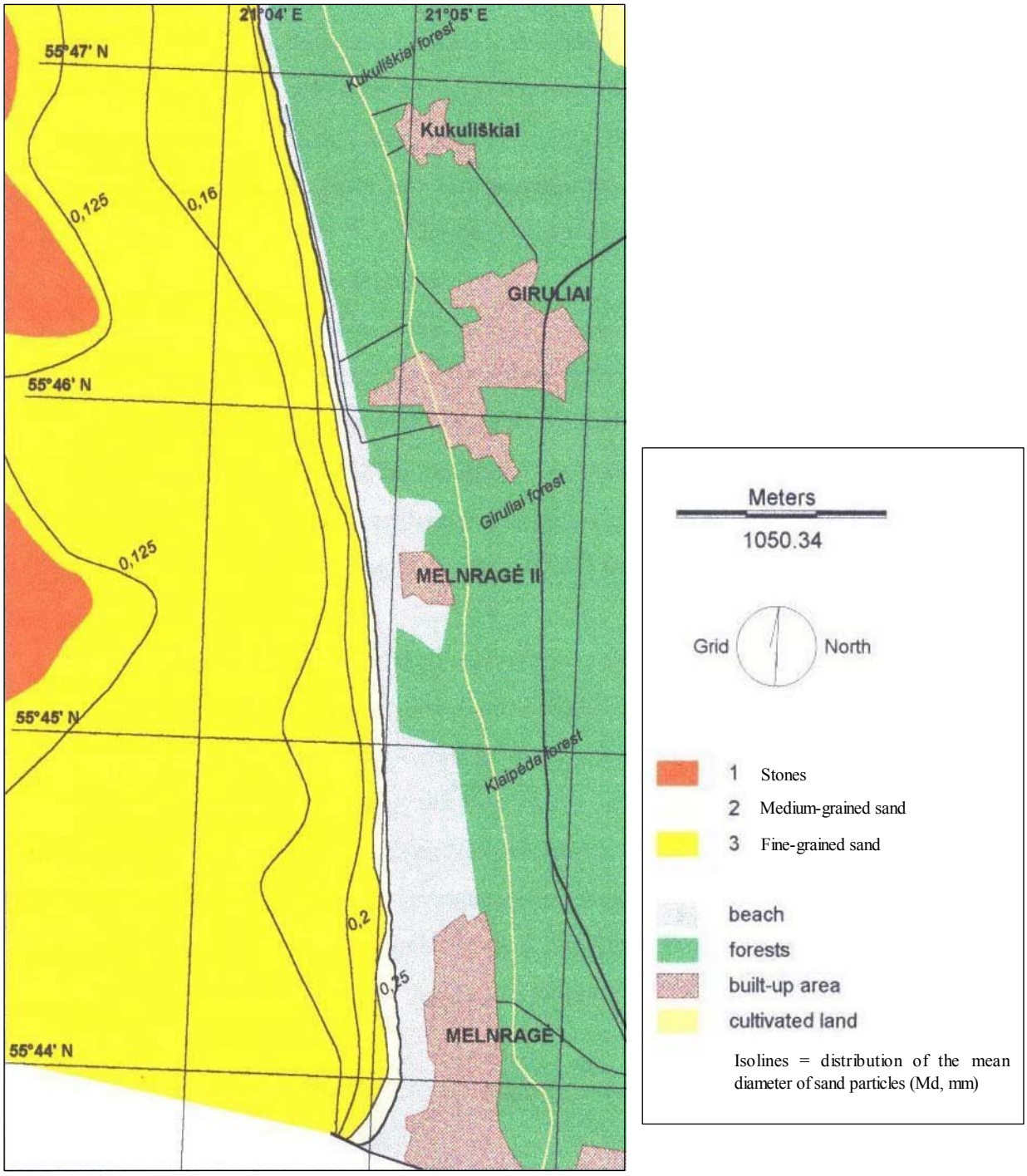
Other symbols

- 165 — Barehole and its number
- I — I — Line and number of geological cross section
- Sub-Quarternary surface

System	Series	Division	Group	Formation	Subformation	Genetic classification	
Quarternary	Holocene					t IV	Technogenic deposits
						d IV	Deliuvial deposits
						b IV	Biogenic deposits
						a_s IV	Alluvial sediments of overbank terrace
						a_1 IV	Alluvial sediments of overbank I terrace
						v IV	Eolian deposits
						m IV	Marine recent sediments
						m IV PL	Marine Post-Litorina sediments
						m IV L	Marine sediments of Litorina Sea
						l IV A	Limnic sediment of Ancylus Lake
						v III-IV	Eolian deposits
	Pleistocene	Upper	Nemunas	Upper Nemunas	Baltija	lg III B	Limnoglacial sediment of Baltic Ice Lake
						lg III bl	Limnoglacial sediments of periglacial basins
						lg eg III bl	Limnoglacial interglacier sediments
						f III bl	Fliuvioglacial deposits
						f^t III bl	Fliuvioglacial marginal deposits
						g^t III bl	Glacigenic deposits: marginal moraine (till)
						g III bl	Glacigenic deposits: basal (monolitic) moraine (till)
					Grūda	gd III gr	Glacigenic deposits: deformation at moraine (till)
		Middle	Žeimena	Medininkai		f II md	Fliuvioglacial deposits
						g II md	Glacigenic deposits
				Pamarys		l II pm	Limnic sediments
				Žemaitija		lg II žm	Limnoglacial sediments
						f II žm	Fliuvioglacial deposits
						g II žm	Glacigenic deposits
			Lietuva	Dainava		g II dn	Glacigenic deposits

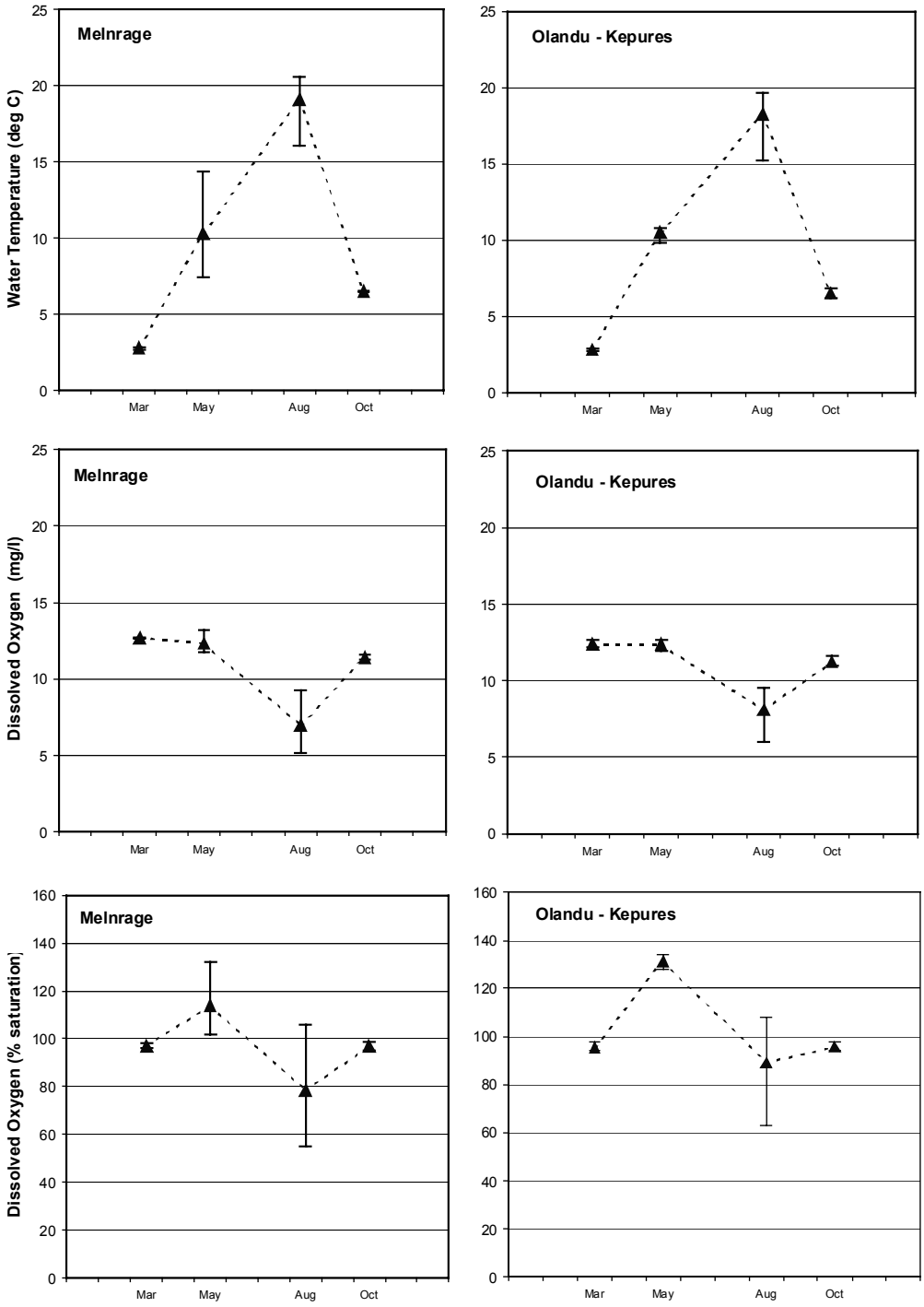
Source: Jokšas K., Galkus A., Stakėnienė R. (2003). The Only Lithuanian Seaport and its Environment. 314 p.

Figure III.6.2-2 Geological Map of Klaipeda.



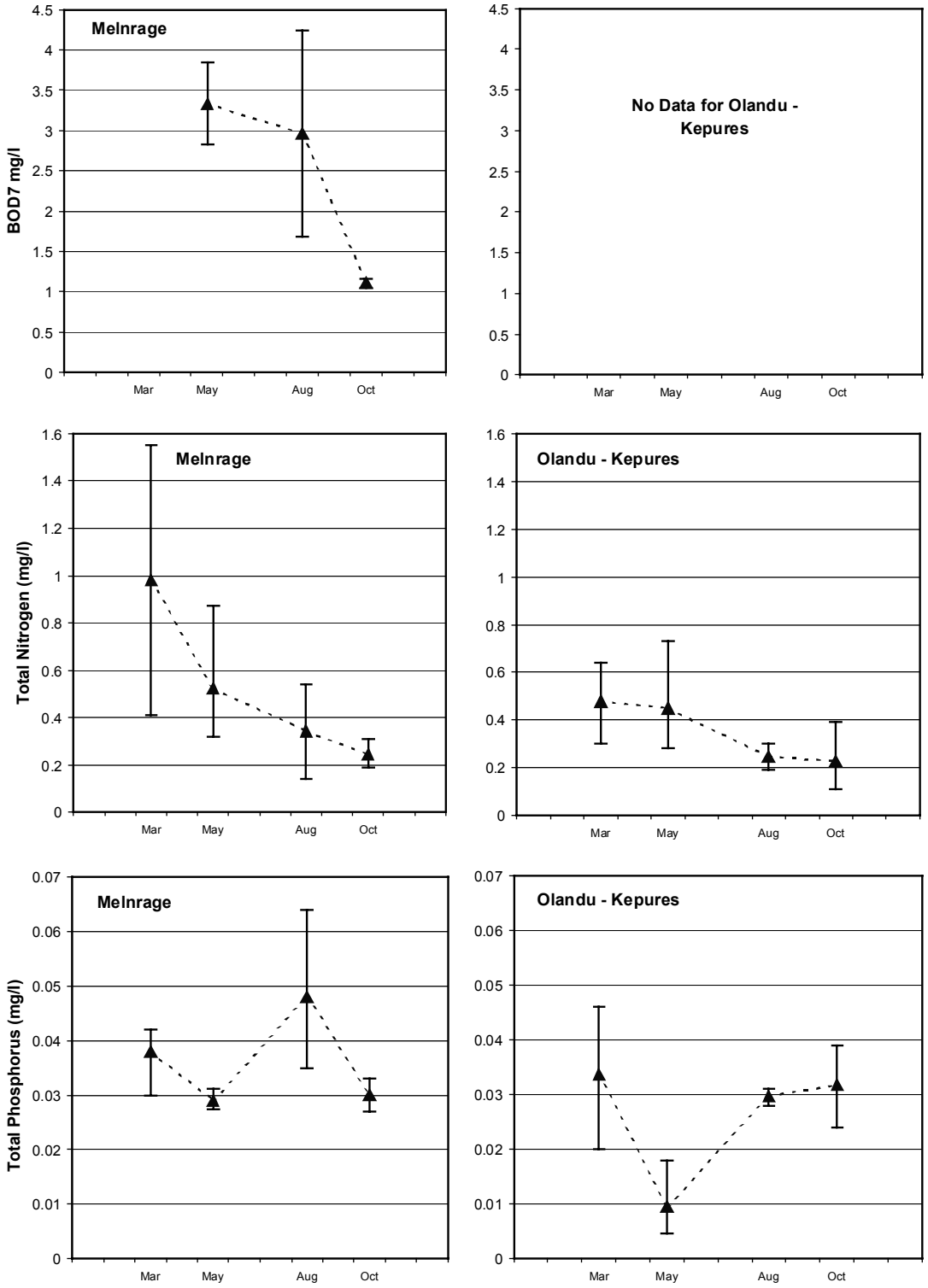
Source: Selection of the experimental site for recultivation of the underwater slope of the coastal zone with clean sand and monitoring of sand particles dispersion during the reconstruction of the entrance channel of Klaipeda port. Scientific report. Institute of Geography. Vilnius, 2000.

Figure III.6.2-3 Distribution of surface sediments near Melnrage (2000)



Source: Ministry of Environment, Centre of Marine Research
N.B. Vertical bars = monthly maximum and minimum

Figure III.6.2-4 Water Quality on the coast north of Klaipeda (2002). Figures = monthly average of measurements taken at 1, 10 and 13 or 15 m, offshore of Melnrage (left) and Olandu Kepures.



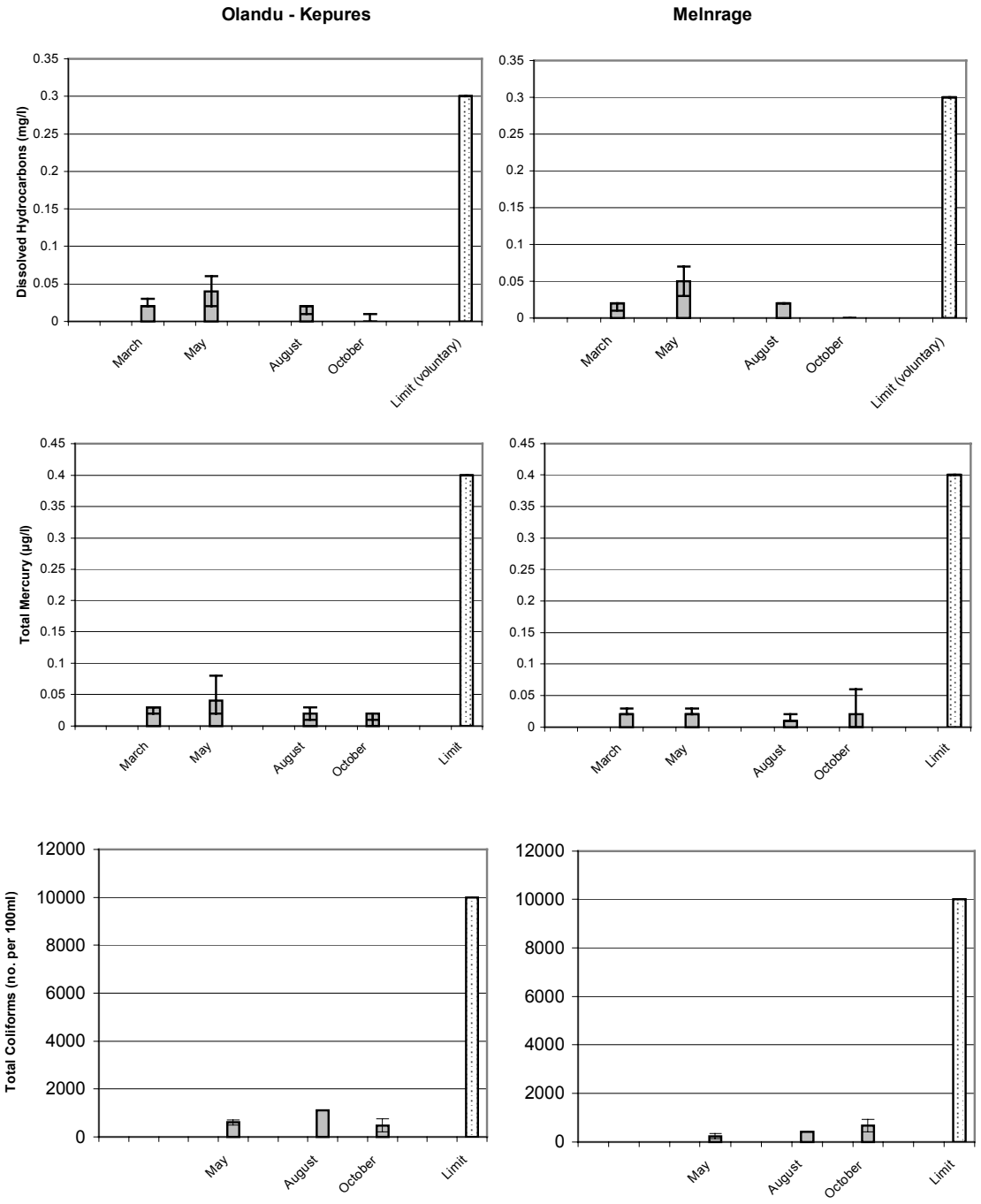
Source: Ministry of the Environment, Centre of Marine Research
N.B. Vertical bars = monthly maximum and minimum

Figure III.6.2-4 (cont.) Water Quality on the coast north of Klaipeda (2002). Figures = monthly average of measurements taken at 1, 10 and 13 or 15 m, offshore of Melnrage (left) and Olandu Kepures

(2) Sediment Quality

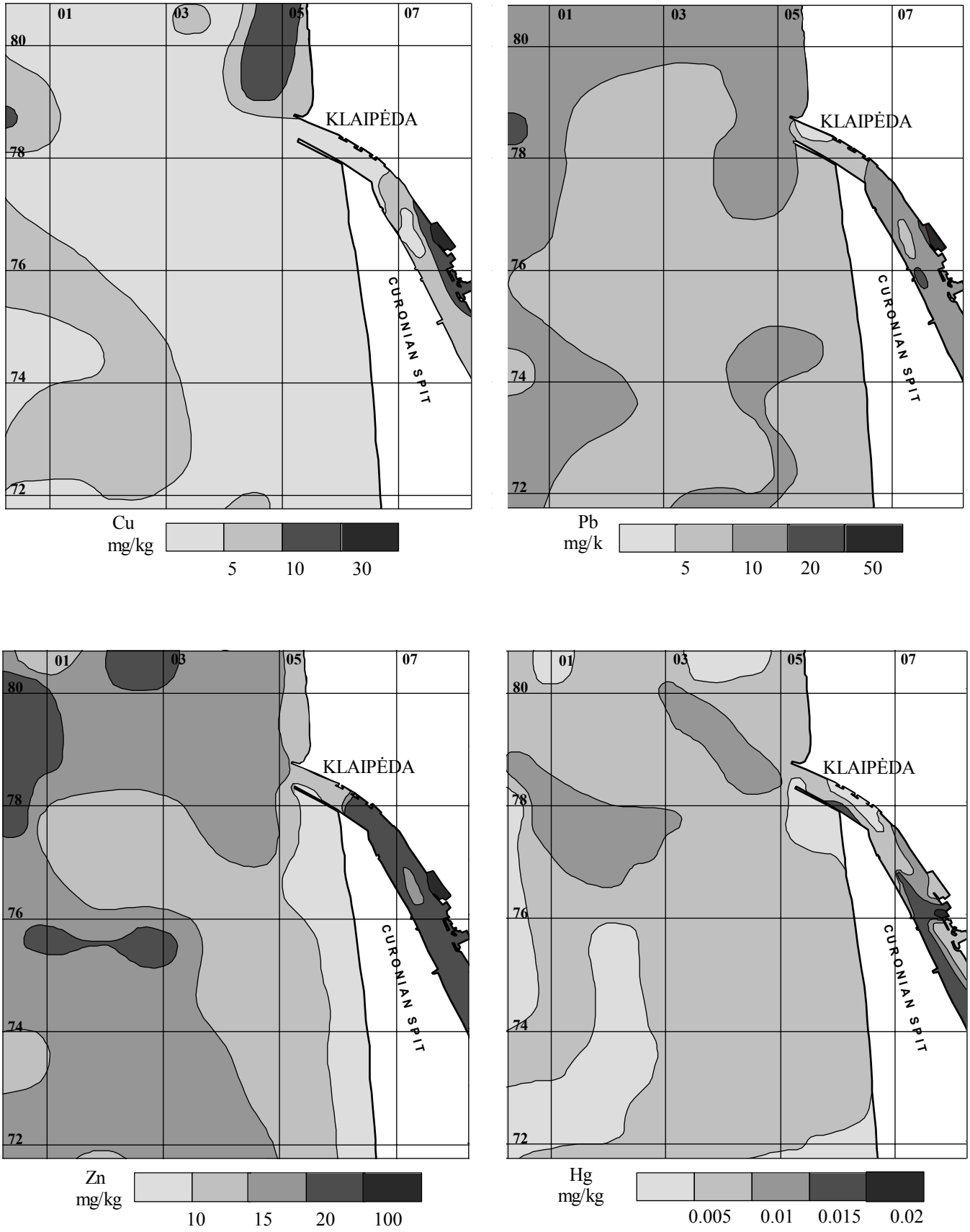
Figure III.6.2-6 shows the concentrations of certain heavy metals in surface sediments (0-10 cm) in the outer part of the port channel and in the offshore area, from data collected by Joksas *et al* (2003). Given that there is little evidence of pollution in water at the coast, then the sediments would also be expected to be relatively unpolluted. Comparing Figure III.6.2-6 with Table III.5.2-3 above (which summarises the MoE system of classifying Klaipeda sediments according to their levels of metals and hydrocarbons), confirms that this is the case. Levels of Copper, Lead and Zinc throughout the offshore area are all in the range between "clean" and "little polluted", and Mercury concentrations are well below the "clean" limit (0.1 mg/kg).

Figure III.6.2-6 shows that levels of all metals in sediments are again much higher in the port channel, and particularly in the enclosed harbours, as was indicated by the data collected by KSSA (Figure III.5.2-9 above). This suggests that the port (or the Dane River in the case of Mercury) is the main source of the metals deposited in sediments offshore.



Source of limits : EU Bathing directive 76/160/EEC & EU Shellfish Waters directive (mercury) 79/923/EEC
Source of data:Ministry of Environment, Centre of Marine Research

Figure III.6.2-5 Concentrations of hydrocarbons, mercury and coliform bacteria in water on the coast north of Klaipeda (2002). Figures = monthly average of measurements taken at 1, 10 and 13 or 15 m, offshore of Melnrage (left) and Olandu Kepures. Vertical bars = monthly maximum and minimum



Source: Kęstutis Jokšas, Arūnas Galkus, Rimutė Stakėnienė.
The Only Lithuanian Seaport and its Environment, Vilnius, 2003, 314 p.

Figure III.6.2-6 Concentration of heavy metals in surface sediment (0-10cm) around Klaipeda (1998)

(3) Air Quality

Data collected by the Ministry of Environment in 2000 (presented in Table III.5.2-5 above) showed that air quality in Klaipeda City, at Melnrage and in the port, was generally good. This is a result of several factors, including:

- The windswept nature of this coastal area, which disperses atmospheric pollutants (including those released during port operations) effectively and rapidly;
- Recent changes in Lithuania from coal to natural gas as the main fuel in the energy industry, reducing SO2, CO and other pollutants derived from fossil fuels;
- Changes amongst car-owners and haulage companies, more of whom now use unleaded petrol and/or liquid propane fuel.

There was some concern regarding levels of Nitrogen Dioxide, which exceeded permitted Lithuanian/EU levels on occasion (<4%of the total time), which is probably a result of pollution from traffic.

Table III.6.2-1 shows the results of air quality monitoring by the MoE in 2003, at Bangu gatve in the old part of the city near the Dane River, and at Kalnupes gatve which runs through the northern part of the southern study area, near SC Progresas. This again shows that air quality is relatively good, with levels of all pollutants being similar to and lower than those reported in 2000.

Table III.6.2-1 Air Quality in Klaipeda in 2003, from continuous monitoring conducted by the Ministry of Environment, Klaipeda Region

Pollutant	Location	C_{ave}	C_{max}	EU Limit Values				% Exceedence
				1 hr	8 hr	24 hr	Year	
Dust ($\mu g/m^3$)	Bangu 7	21.67	35.38			50	40 (20 by end 2010)	0
	Kalnupes 3	26.26	47.75					0
SO_2 ($\mu g/m^3$)	Bangu 7	2.604	4.123	266	350	125	20	0
	Kalnupes 3	5.282	9.610					0
CO (mg/m^3)	Bangu 7	0.410	0.618	30	10			0
	Kalnupes 3	0.318	0.472					0
NO_2 ($\mu g/m^3$)	Bangu 7	18.97	23.33	200			40	0
	Kalnupes 3	23.47	35.69					0
NO ($\mu g/m^3$)	Bangu 7	---	---					0
	Kalnupes 3	8.05	13.42					0
NO_x ($\mu g/m^3$)	Bangu 7	---	---					0
	Kalnupes 3	38.90	59.54					0

Source of Limit Values: Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management, the first daughter directive, 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead, and the second daughter directive, 2000/69/EC of 16 November 2000 relating to limit values for benzene and carbon monoxide.

Source of Data: Ministry of Environment, Klaipeda region

6.2.4 Ecology and Nature Conservation

(1) Protected Areas

The ecology and nature conservation value of areas around the port were described in detail in Section 5.2.5 above. This shows that this is a very important location in terms of this aspect of the environment, with many rare habitats and species and some very sensitive sites along the coast and in nearby aquatic and terrestrial areas. Figures III.5.2-10 and III.6.2-7 show that eight areas have been given legal protection by the Lithuanian government because of the importance of their nature, landscape and/or culture, and together these cover over 60% of the total land area in the coastal belt south of Palanga.

Two of the sites are close to Melnrage. These are:

The Curonian Spit National Park (Kursiu Nerija), which covers all of the land on the spit and extends into the adjacent sea and lagoon, and is one of Lithuania's most important nature and landscape sites, as well as being an important tourist destination. The spit contains many rare habitats, including sand-dunes, evergreen and deciduous forest, coastal lagoon and wetland, etc. These support a variety of rare species, several of which are included in the Red Data Book of Lithuania (EPD 1992) which lists the country's rarest and most threatened organisms. This includes 31 of the plants found

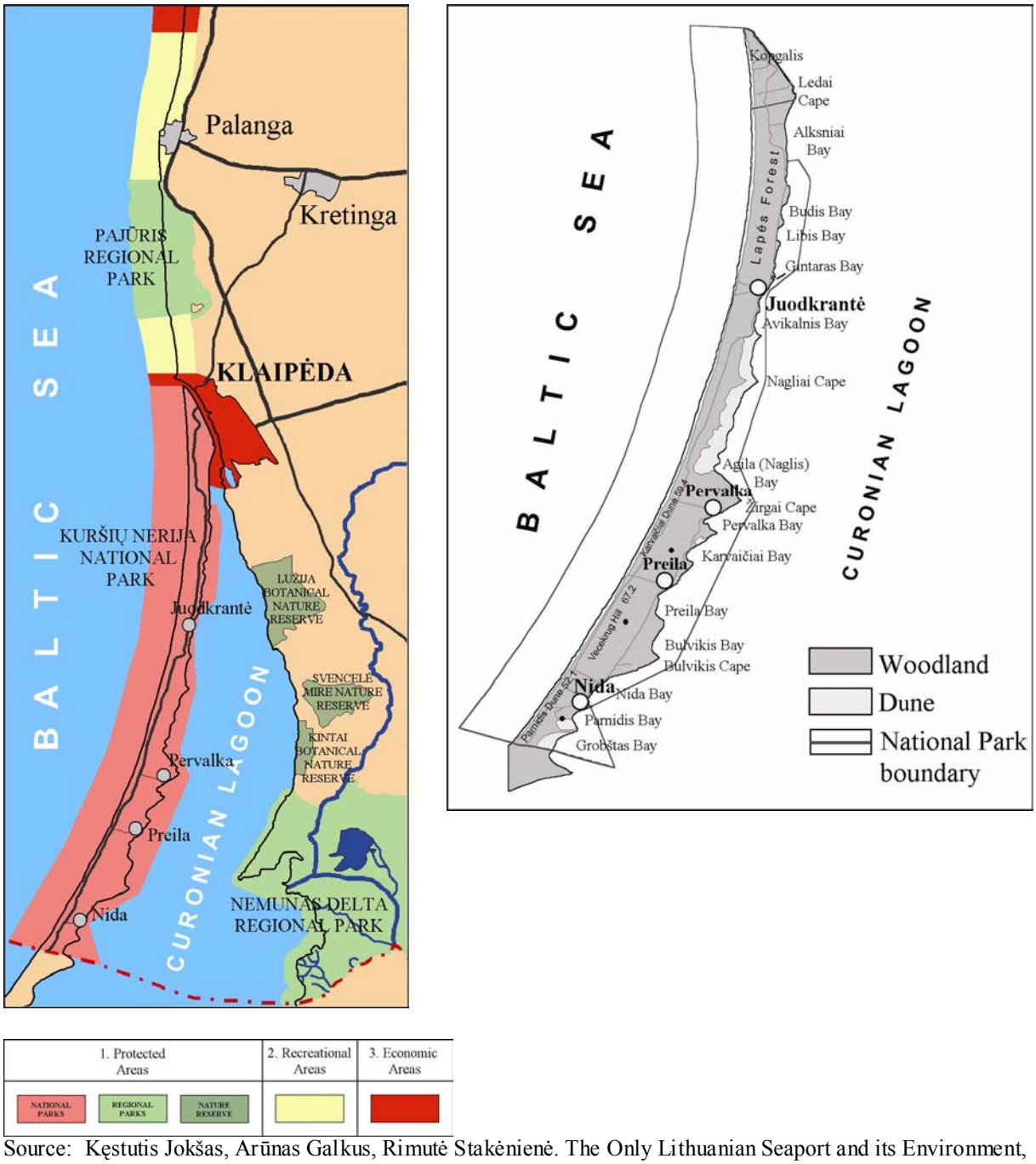
on the Spit, 10 of the mammals, 10 butterflies, and various birds, fish, amphibians and reptiles.

There are 16 conservation areas on the Spit, covering 75% of the land, and many activities are prohibited by law, including lighting fires, driving off the road, walking on the dunes except in specified areas, damaging the flora, and making noise that disturbs nesting birds. Planning laws also prohibit "economic activity", which is the term for construction projects.

The importance of the Spit has been recognised by at least two international designations. IUCN, the World Conservation Union have classified it as a Category II Protected Area (managed mainly for ecosystem protection), and in 2000 the United Nations designated the Spit as one of only 754 World Heritage Sites, as "an outstanding example of a landscape and sand dunes that is under constant threat from natural forces (wind and tide)" (UNESCO 2000). The northern boundary of the Park is less than a kilometre from Melnrage, near the southern port breakwater (Figure III.5.2-10).

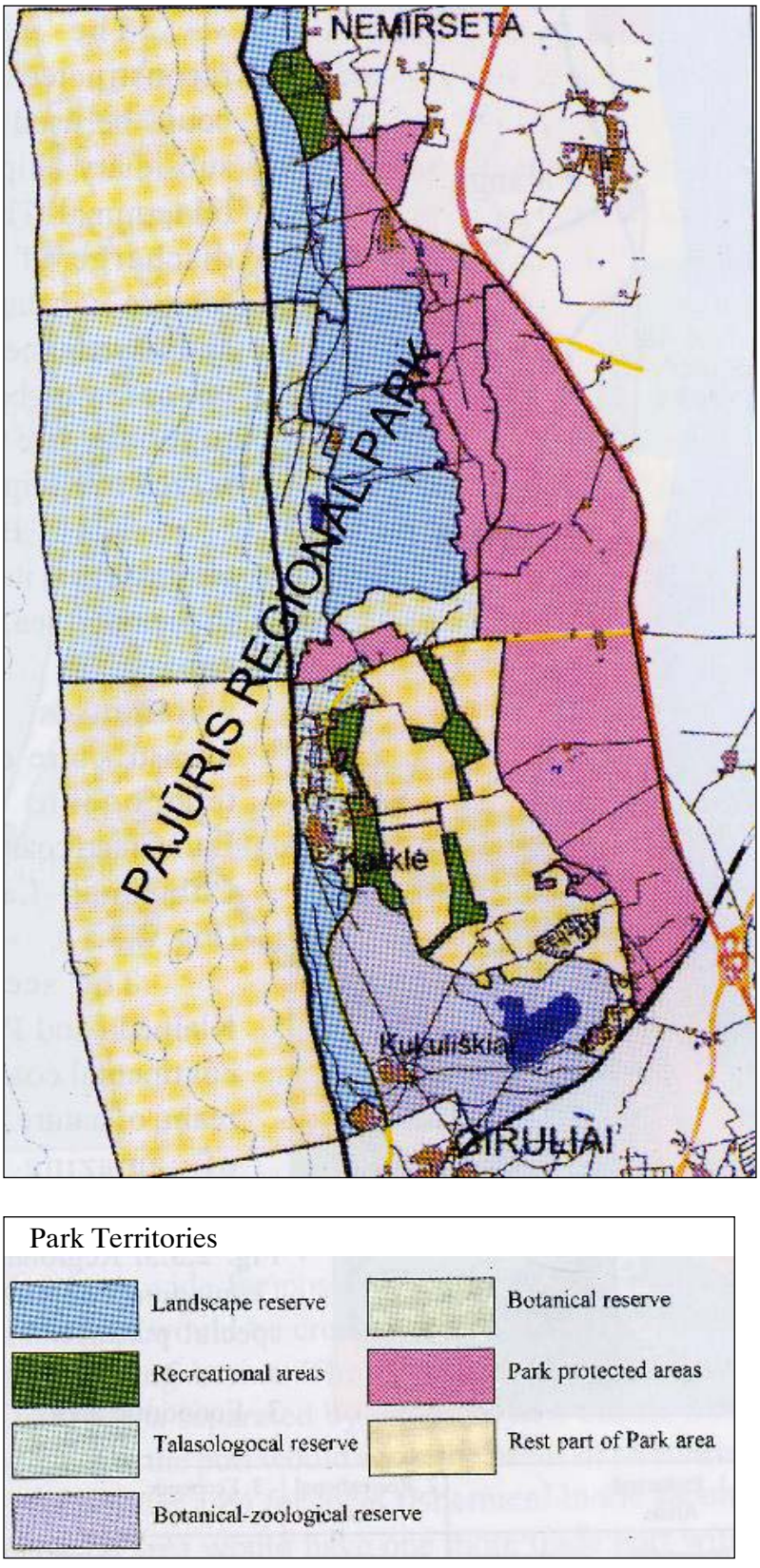
The second site is the Pajuris Regional Park, on the coast approximately 3 km north of Melnrage. As the name suggests this is an area of regional importance, which was established in 1992 to preserve the landscape, ecology and cultural heritage of the coast. The Park covers 5033 ha in total, and includes several locations given specific protection as Nature, Botanical, Zoological, Landscape, Marine and Ethno-Cultural Reserves (Figure III.6.2-8).

Figure III.5.2-10 shows that there is also a small protected area near the southern study area, approximately 800 m to the west. This is the Smelte Botanical Reserve, which is a narrow strip of land, 2 ha in total, within the port along the eastern side of the Ferry Terminal peninsula. This reserve was established to protect halophytic plant communities found here, including the nationally rare *Juncetum gerardii*.



Source: Kęstutis Jokšas, Arūnas Galkus, Rimutė Stakėnienė. The Only Lithuanian Seaport and its Environment, Vilnius, 2003, 314 p.

Figure III.6.2-7 Areas protected for nature conservation on the Klaipeda coast, and the main habitats in the Curonian Spit National Park



Source: Kęstutis Jokšas, Arūnas Galkus, Rimutė Stakėnienė. The Only Lithuanian Seaport and its Environment, Vilnius, 2003, 314 p.

Figure III.6.2-8 Location and main designated areas within Pajuris Regional Park

(2) Ecology

Aside from the nearby protected areas, the other main ecological interest of the Melnrage coast is because it is an important site for fish migration, and is also both a spawning area, where fish breed, and a nursery site, where young fish live whilst they grow into adults.

As explained in Section 5.2.5 above, many fish that live in the Baltic Sea, migrate through the Port Channel and into the Curonian lagoon to spawn each year. These individuals travel along the coast and congregate near the mouth of the channel before entering the lagoon, and Figure III.6.2-9 shows that the coastal migration route covers most of the inshore area between Melnrage and Giruliai, down to about the 10 m contour.

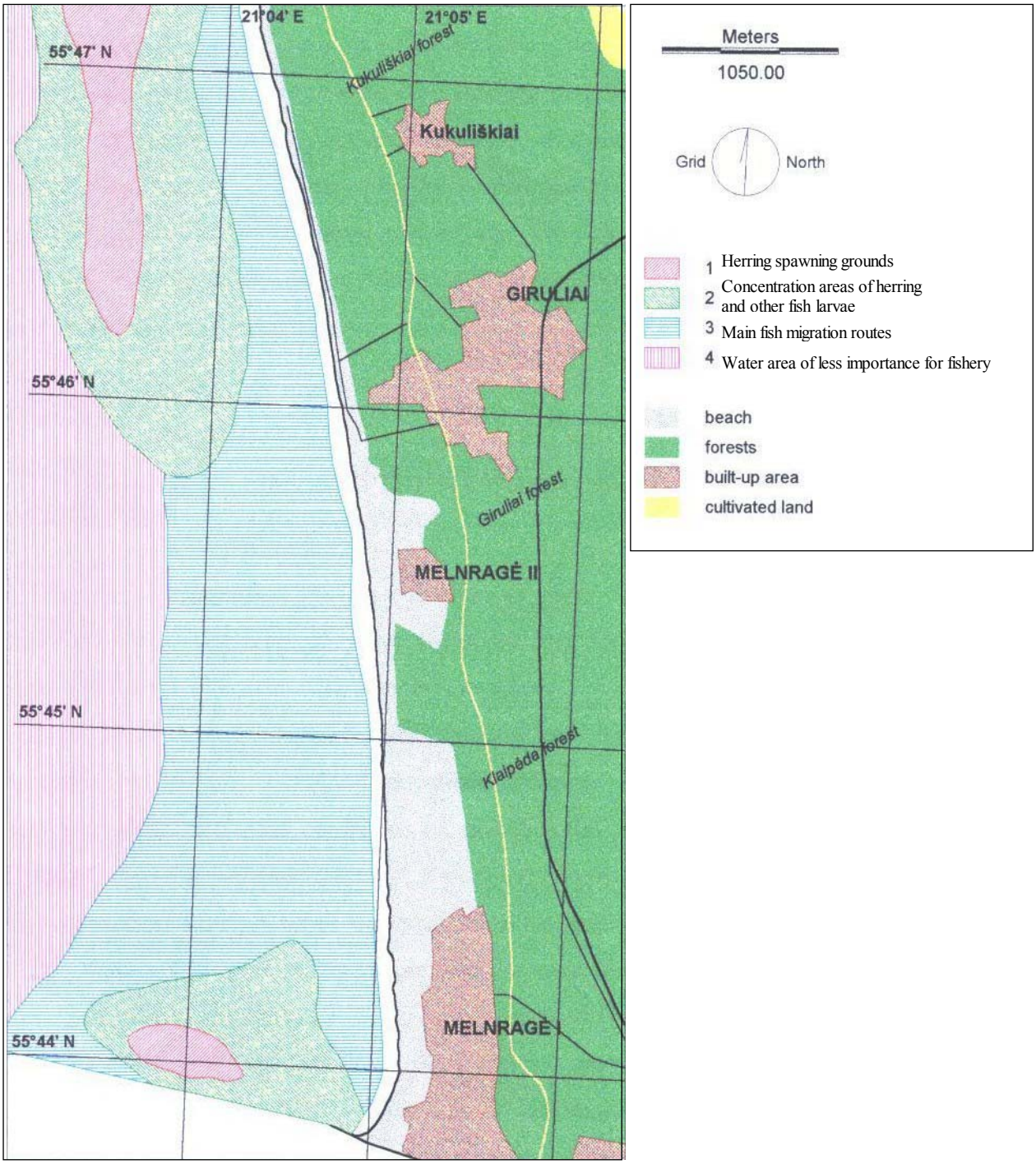
Baltic herring do not spawn in coastal lagoons or river mouths, but instead lay their eggs on rocks and other hard substrates in shallow water near the coast. Figure III.6.2-9 shows that there are two such herring spawning sites near Melnrage: a large area north-west of Giruliai, and a smaller area approximately 1 km from the Melnrage beach. The latter location is in fact the northern port breakwater, where as explained in Section 5.2.5 the rock revetments and concrete structures of both breakwaters are covered with high densities of herring eggs each year, during the spring spawning period (Harris 2000).

When herring larvae hatch they stay around the spawning grounds as the many crevices and spaces between the rocks provide refuge from predators. They are joined by other fish that hatch in the lagoon, so these two sites are also nursery grounds for a variety of species, where the fish remain until they grow into young adults.

Figure III.6.2-10 shows the main habitats and communities on the seabed along the Melnrage coast, and these are much as described in Section 5.2.5 above. The seabed consists almost entirely of sand, and the fauna is dominated by species that burrow beneath the surface, and feed on organic matter in the substrate, or filter out plankton from the water.

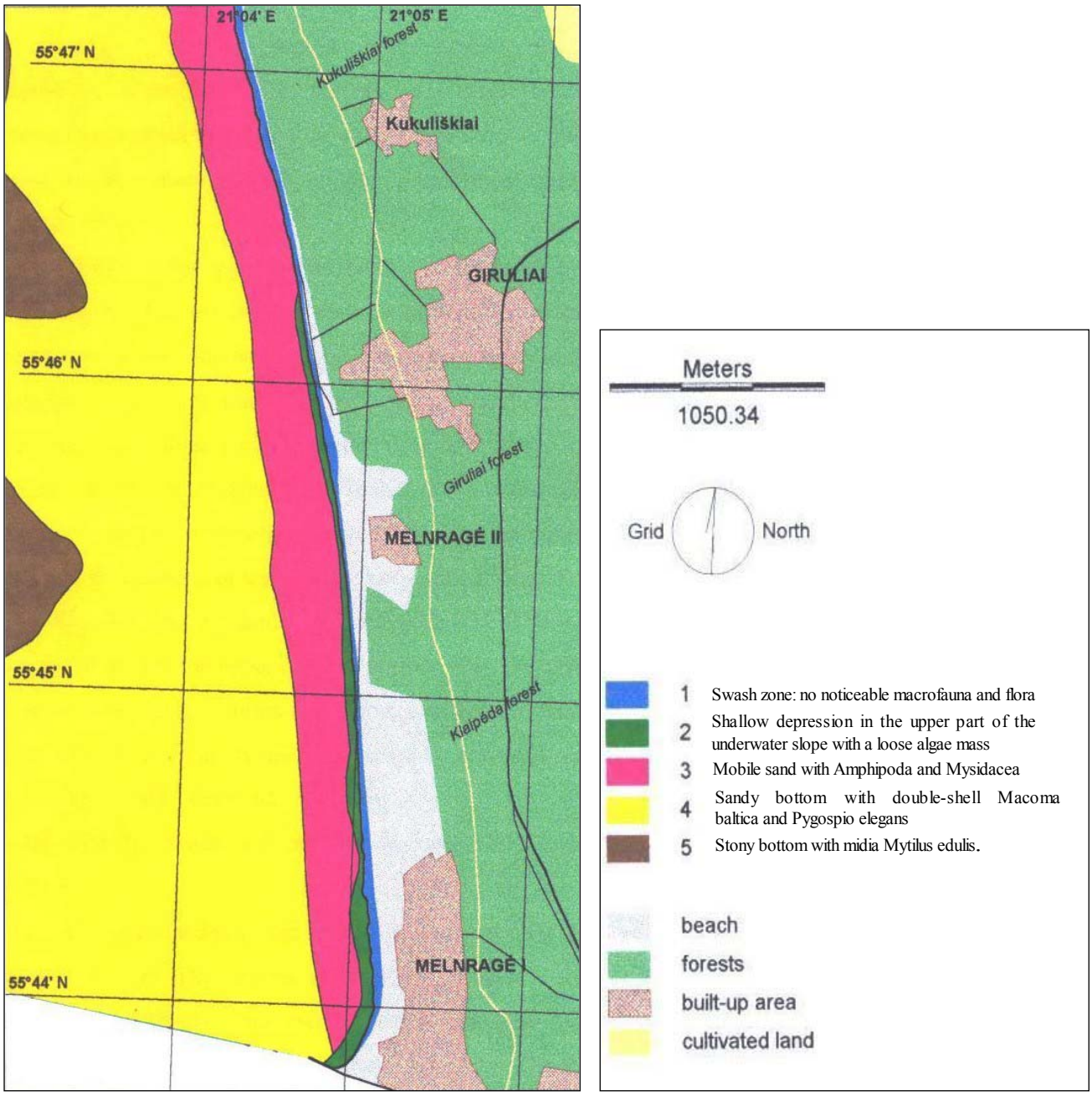
At the edge of the sea the sand is moved about by waves, so there is little flora or fauna that is able to colonise this area. The wave-cut depression in the subtidal zone becomes filled with decaying seaweed, and this attracts organisms that feed on this material. There is then a belt down to around 5 m depth where the sand is moved to an extent by wave action, so this is colonised by mobile species that can re-burrow rapidly if they are washed out, including various types of shrimp. The majority of the area below about 5 m is inhabited by a typical soft sediment fauna of burrowing molluscs, including the Baltic tellin *Macoma balthica* and the tube-dwelling worm *Pygospio elegans*. There are a few areas of harder stony substrate in deeper water, where mussels, barnacles and other encrusting species become attached.

Figure III.6.2-10 shows that the main terrestrial habitat in the Melnrage area is the large expanse of Giruliai Forest to the north and east of the village. Photo III.6.2-1 shows that this is an extension of the forest that covers most of the Curonian Spit to the south, and it may originally have developed at the same time when these areas were part of one continuous coastal strip. The trees are mainly pine and other evergreens, but there is little other information on the ecology of the forest. As it is not a protected area it must be assumed that it does not contain rare or vulnerable species or habitats.



Source: Kęstutis Jokšas, Arūnas Galkus, Rimutė Stakėnienė. The Only Lithuanian Seaport and its Environment, Vilnius, 2003, 314 p.

Figure III.6.2-9 Main areas that are important for fish on the coast north of Klaipeda



Source: Selection of the experimental site for recultivation of the underwater slope of the coastal zone with clean sand and monitoring of sand particles dispersion during the reconstruction of the entrance channel of Klaipeda port. (2000). Scientific report. Institute of Geography. Vilnius, 2000.

Figure III.6.2-10 Main habitats and communities on the coast north of Klaipeda

There is also no information on the ecology of the area to the south-east of the port, although it is known to consist of a large area of uncultivated grassland, and there are some marshy areas in which reeds grow, and small ponds that may support amphibians, insects and birds. Again none of this area is designated so it must be assumed to be of no special nature conservation interest, and it is therefore unlikely that the flora and fauna includes any rare or important species.

6.2.5 Human Environment

(1) Melnrage

Figure III.6.2-11 is a map of the Melnrage area, Figure III.6.2-12 shows land use from data provided by the State enterprise "Registru Centras", and Table III.6.2-2 presents certain socio-economic indicators for the area. This data shows that Melnrage is a small coastal village located adjacent to a long, wide beach, north-west of Klaipeda Port. There are an estimated 1,500 permanent residents who live in houses situated around the main street (Molo gatve) that runs roughly north-south parallel to the coast, or around the various smaller side streets.

There is a small square in the centre of the village (Photo III.6.2-3), from which Audros gatve leads out to the west to join the main road running north to Giruliai (Giruliu plentas) and south-east towards Klaipeda (P Lideiko gatve). There are a few business enterprises within and around the square, including a hotel and some restaurants and cafes, an "Iki" supermarket, some smaller shops, and sports facilities. The port area abuts onto the southern edge of the village, where the oil storage tanks of the Nafta terminal are a prominent landmark (Photo III.6.2-4). To the north and east the village is surrounded by the dense canopy of the Giruliai forest, and to the west there are views of the unspoilt seascape over and through the dunes, and between the small areas of coastal woodland.

Housing in Melnrage includes both traditional and modern dwellings, and in recent years there has been an increase in new building, mainly of high quality property (Photo III.6.2-5). Newer residents derive mainly from the middle- and higher- income brackets, and include people attracted by the peace and tranquility of the area and the proximity of the coast, and others seeking business opportunities from the influx of visitors in the summer.

The population of Melnrage increases by an estimated 2500 people each day throughout July and August, as people come into the area to use the beach for swimming, sunbathing and recreation. Visitors include residents of Klaipeda and Giruliai, plus holidaymakers from elsewhere in Lithuania and abroad. However the Curonian Spit and Palanga to the north are the favoured destinations for visitors from outside the area, and the major users of the Melnrage beach are local residents and people from Klaipeda, wishing to avoid the more crowded beaches to the north and south.

(2) Southern study area

The southern study area is quite different in character, and unlike Melnrage is not a naturally-defined area, delimited by topography, human development or other specific features. Instead it is artificially-defined, as the land within 500 m on either side of the proposed route of the new rail line. There is therefore considerable variability in the features of the area, and no coherent structure to its character as there is at Melnrage.

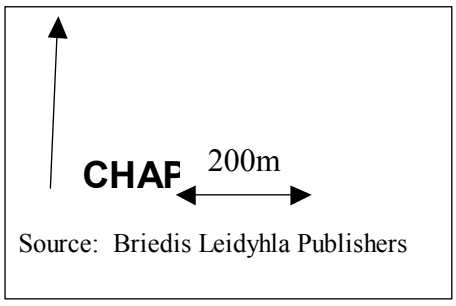
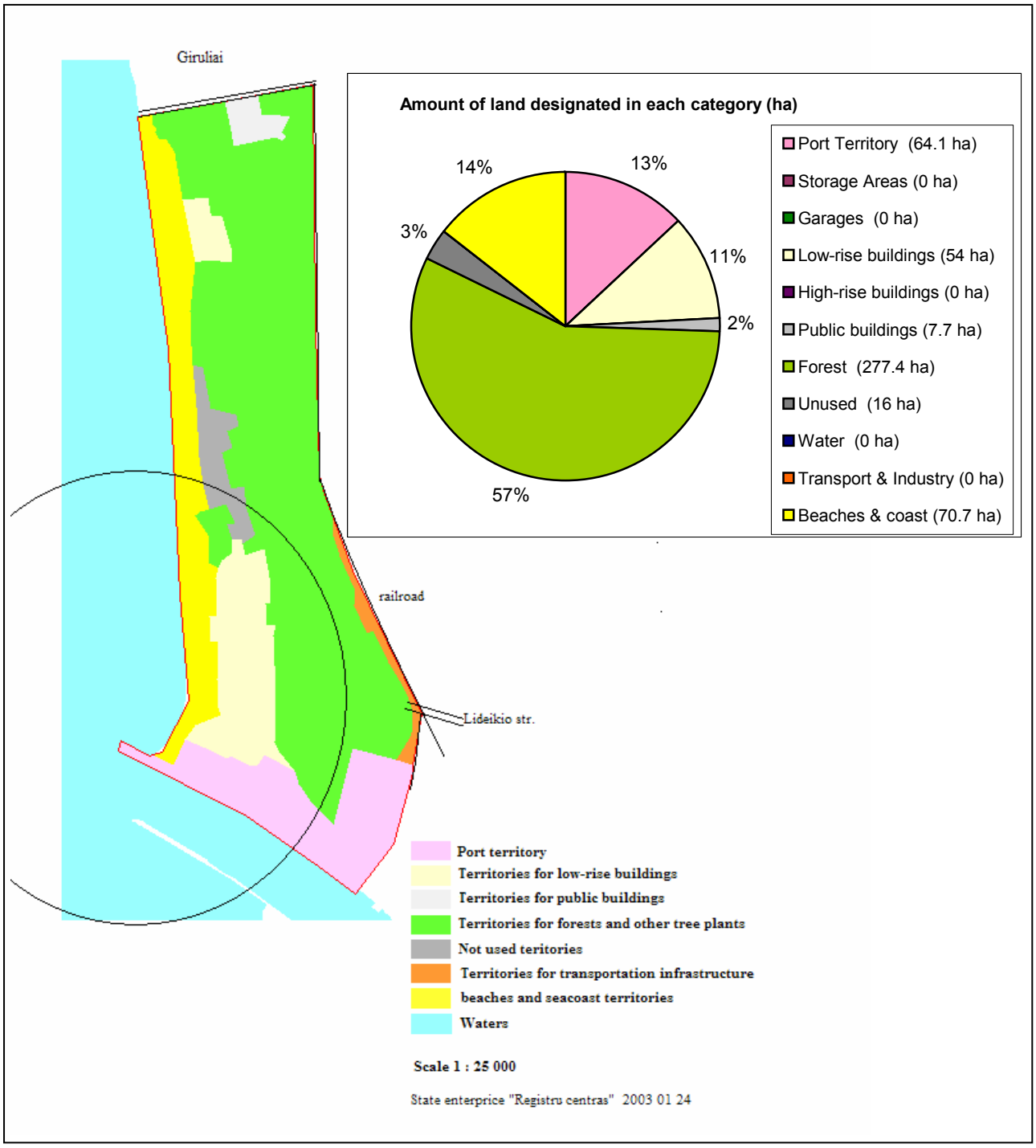


Figure III.6.2-11 Map of Melnrage



Source: State enterprise Registru Centras

Figure III.6.2-12 Land Use at Melnrage

Table III.6.2-2 Socio-economic analysis of the two EIA study areas

				Formal Employment		Public Health	Public Transport	Culture
Location	**Size of Study Area ha**	**Permanent Residents No of persons**	**Summer Visitors Per day**	**No of registered Enterprises[1]**	**No of jobs**	**No of staff2**	**Buses per[3] working day**	**No of[4] Scheduled Objects**
Melnrage	1225	*1500*	*2500*	22	*450*	1	121	1
Southern	500	*5200*	*0*	108	*700*	2	288	9

N.B. Values in *Italics* are estimates

Sources:

1. http://www,infoplius.lt/search_.asp (Lithuanian Telecom Co.)
2. Klaipeda Public Health Centre
3. http://www.klaipedatransport.It
4. http://www.kpc.lt/index.html (Register of immobile cultural values)

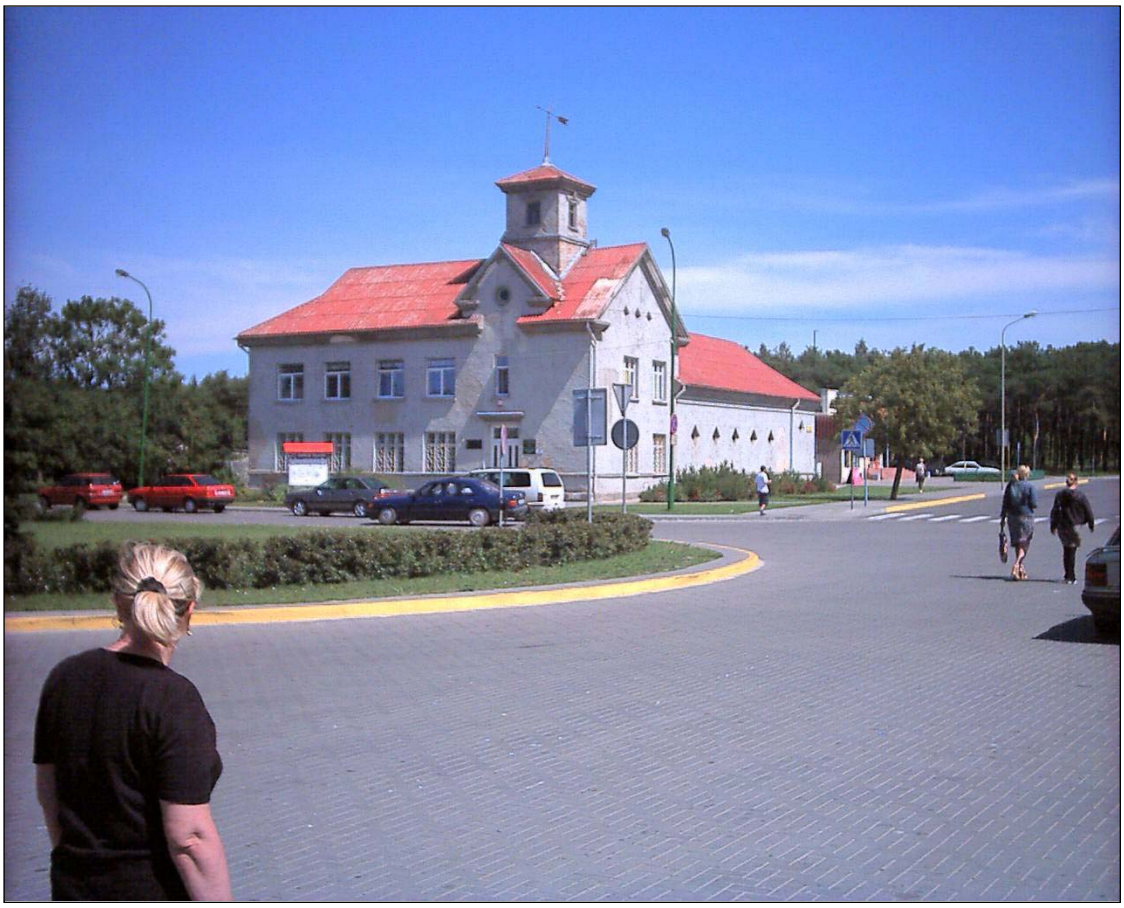


Photo III.6.2-3 Melnrage village square

Photo III.6.2-4 Klaipedos Nafta Oil Terminal, south of Melnrage

Photo III.6.2-5 Housing in Melnrage

Figures III.6.2-13 and III.6.2-14 show that around 25% of the land is unused, another 30% is occupied by the port, and around 15% is used for transport and industry. The unused land is mainly north and east of the rail line, in the southern part of the area, and this is mainly the uncultivated grassland and ponds and marshy ground described in Section 6.2.4 above. The port covers most of the land to the west of the rail line, and this includes reserved port territory behind the Western Shiprepair Yard, and to the north, land occupied by SC Progresas, and the Terminals of Smelte, Transfosa and Bega. The land used for transportation includes the area of Draugyste Station in the south, a training area for driving schools, plus other smaller areas to the north.

There are a large number of registered business enterprises in this area, 108 in total (Table III.6.2-2), employing an estimated 700 people. Most are located in the northern half of the study area, both within the port and outside. In addition to the large stevedoring operations of Smelte and Bega, many of the smaller enterprises are engaged in activities related to the port, such as ship repair, metal processing, machinery manufacture, construction, transportation, shipping, etc. However there are also many businesses providing services to the community, including shops, taxi firms, hairdressing, advertising, education, accountancy, restaurants, computer supplies, petrol stations, etc. Many of these are in the north-east corner beyond Kalnupes gatve, which is the most heavily populated area.

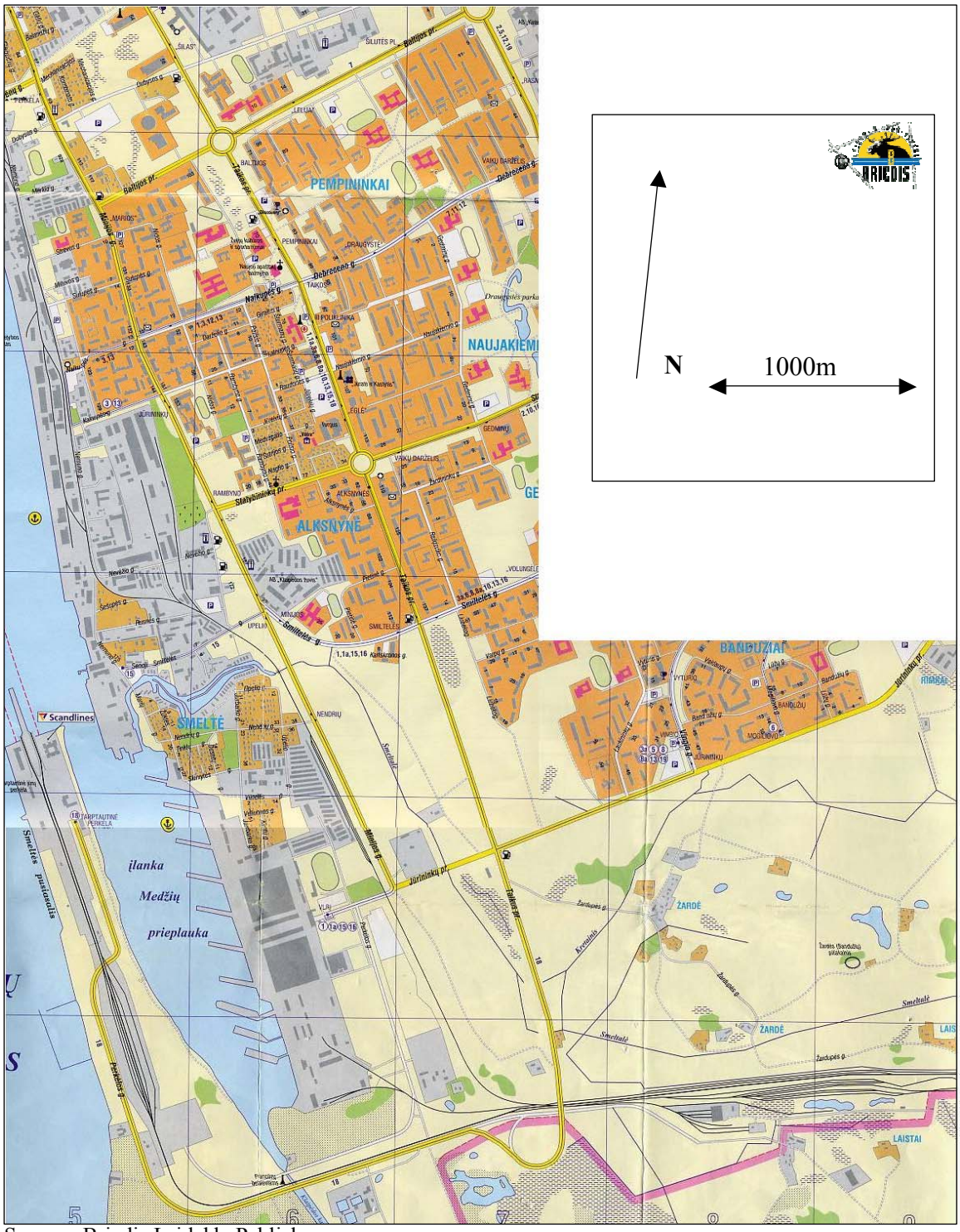
There are only two areas with a significant resident population, and these are:

- Towards the centre, west of the rail line and south of the Smeltale River, where a village of around 200 people has developed on land designated in City plans as reserved for future use by the port;
- In the north-east, between Kalnupes gatve and Varnenu gatve, where city development extends to the west of Minijos gatve, and there are several high rise apartment blocks, as well as low rise dwellings, plus many of the businesses mentioned above, public buildings, etc. The resident population of this area is estimated at around 5000 persons (Table III.6.2-2).

Both areas consist of a mixture of types of housing, but there are few of the high quality dwellings found at Melnrage, and residents are mainly in the middle- income bracket, and there are some areas of lower- income dwellings.

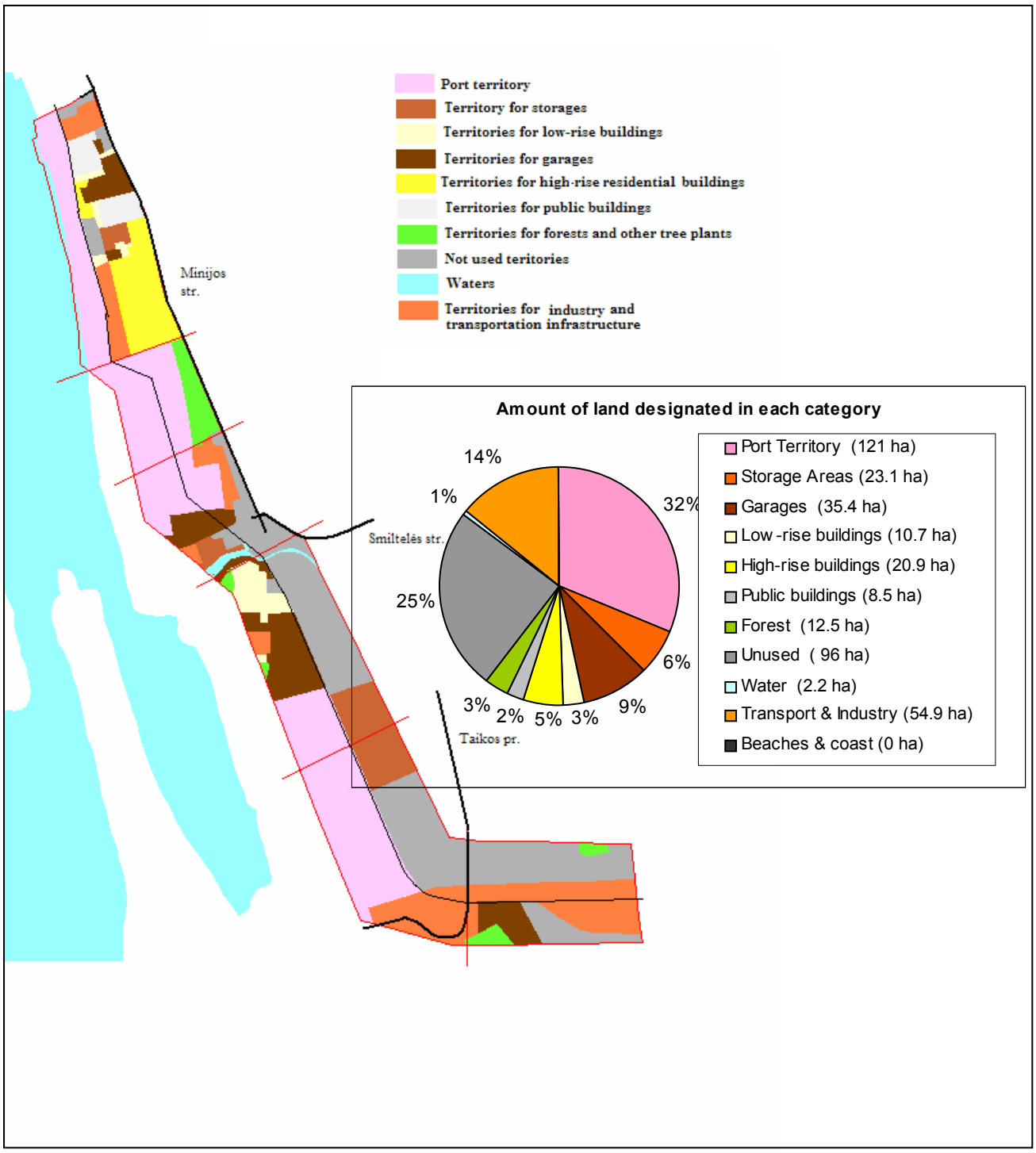
This is not an area with any attractions for visitors, although some may pass through along Minijos gatve which is one of the main north-south highways through the city. The population does increase by several hundred during each weekday however, as people come into the area to work.

Minijos gatve is a dual-laned modern highway, and there are several connections at right angles leading to other main roads in the city, as well as smaller roads into the suburbs. The area is well supplied in terms of public transport, with almost 300 buses passing through during each working day (Table III.6.2-2). It is also an area with some cultural interest as the Lithuanian Register of Cultural Objects lists nine sites within the boundary, of which two are old settlements north of Draugyste Station, six are cemeteries, and there is one preserved building, Nemuno 115.



Source: Briedis Leidyhla Publishers

Figure III.6.2-13 Map of the Southern Study Area



Source: State enterprise Registru Centras

Figure III.6.2-14 Land Use in the Southern Study Area

Photo III.6.2-6 Views of the Southern Study Area